Claims

What is claimed is:

1. An internally-cooled fluid directing component comprising:

an elongated body member having a first end and a second end;

an interior cavity disposed within said body member, said interior cavity having a cooling fluid inlet and a cooling fluid outlet;

a partition member disposed within said interior cavity and positioned to divide said interior cavity into a first channel and a second channel;

a turning zone disposed within interior cavity and fluidly linking said first and second channels;

at least one boundary member disposed within said turning zone, said at least one boundary member dividing said turning zone into a first guided-flow region and a second guided-flow region;

wherein said first channel, said turning zone, and second channel cooperatively form a flowthrough path adapted to transmit cooling fluid between said cooling fluid inlet and said cooling fluid outlet,

whereby said first and second guided-flow regions are adapted to direct a first portion of cooling fluid through said first guided-flow region and a second portion of cooling fluid through said second guided-flow regions, respectively, thereby allowing strategic cooling of said turning zone.

2. The internally-cooled fluid directing component of Claim 1, wherein said first guided-flow region is proximate a first end of said partition member and said second guided-flow region is proximate a tip wall of said interior cavity.

3. The internally-cooled fluid directing component of Claim 1, wherein said boundary member is contoured to substantially surround said first guided-flow region.

4. internally-cooled fluid directing component of Claim 3, wherein said first guided-flow region includes a swirl-inducing region defined by said contoured boundary member.

5. The internally-cooled fluid directing component of Claim 4, wherein said swirl-inducing region is fluidly connected to said first channel by an entrance region and an exit region, said entrance region and said exit region, and said swirl-inducing region being sized and shaped to cooperatively direct said first portion of cooling fluid along a vortex-shaped flowpath.

6. The internally-cooled fluid directing component of Claim 5, wherein said entrance region and exit region are spaced apart by said partition member.

7. The internally-cooled fluid directing component of Claim 5, wherein said first guided-flow region is adapted to flow fluid a first flow rate and said second guided-flow region is adapted to flow fluid at a second flow rate, wherein the ratio of said first flow rate to said second flow rate is within the range of about 1 to about 4.

8. The internally-cooled fluid directing component of Claim 5, wherein said entrance region is characterized by a first distance, and wherein swirl-inducing region is characterized by a second distance, and wherein the ratio of said second distance to said first distance is within the range of about 10 to about 15.

9. The internally-cooled fluid directing component of Claim 3, wherein said first guided-flow region is proximate a first end of said partition member and said second guided-flow region is proximate a tip wall of said interior cavity.

10. The internally-cooled fluid directing component of Claim 9, wherein second guided-flow region is disposed between said boundary member and said interior cavity.

11. The internally-cooled fluid directing component of Claim 9, wherein second guided-flow region includes at least one tapered region adapted to provide accelerated flow adjacent a corner of said interior cavity.

12. The internally-cooled fluid directing component of Claim 11, wherein second guided-flow region includes turbulence increasing elements.

13. The internally-cooled fluid directing component of Claim 1, wherein second guided-flow region further includes at least one tapered region adapted to provide accelerated flow adjacent a corner of said cavity

14. The internally-cooled fluid directing component of Claim 1, wherein said body member is characterized by an airfoil-shaped cross section including a leading edge spaced apart from a trailing edge by a first sidewall and an opposite second sidewall.

15. The internally-cooled fluid directing component of Claim 1, wherein said boundary member extends flow-wise within said turning zone.

16. An internally-cooled fluid directing component, comprising:

an elongated body having an interior cavity disposed therein, said interior cavity including a cooling fluid flowpath;

a first guided-flow region disposed within said flowpath and a second guided-flow region disposed within said flowpath, said guided-flow regions being separated by a contoured boundary member disposed therebetween;

said first guided-flow region being substantially surrounded by said boundary member, and said second guided-flow region being disposed between an end of said cavity and an outer surface of said boundary member;

said first guided-flow region being adapted to produce a vortex,

whereby said first guided-flow region is adapted to cool a region surrounded by said boundary member, and said second guided-flow region is adapted to cool a region disposed between an end of said cavity and an outer surface of said boundary member.

17. The internally-cooled fluid directing component of Claim 16, further including a partition member in said interior cavity to form a first channel and a second channel, said first and second channels being fluidly linked via a turning zone disposed proximate an end of said interior cavity, said channels and said turning zone being disposed within said flowpath.

18. The internally-cooled fluid directing component of Claim 17, wherein said boundary member in said turning zone and said first guided-flow region and a second guided-flow region comprise said turning zone.

19. A method of internally cooling a guide member comprising the steps of:

providing an internally-cooled fluid guide component having an elongated body with an interior cavity disposed therein, said interior cavity including a cooling fluid inlet and a cooling fluid outlet, said cooling fluid inlets and outlet being fluidly linked by a flowpath extending therebetween;

disposing a partition member in said interior cavity to form a first channel and a second channel, said first and second channels being fluidly linked via a turning zone disposed proximate an end of said interior cavity, said channels and said turning zone being disposed within said flowpath;

disposing a boundary member in said turning zone, said boundary member dividing said turning zone into a first guided-flow region and a second guided-flow region,

attaching a source of cooling fluid to said cooling fluid inlet;

flowing cooling fluid through said cooling fluid inlet to said exit through said flowpath, whereby cooling fluid flowing through said first guided region cools a region proximate said partition member and cooling fluid flowing through said second guided flow region cools a region disposed between said boundary member and said end of said cavity.

20. A method of internally cooling a guide member wherein said first guided flow region includes a swirl-inducing region adapted to produce a vortex of cooling fluid within said first guided-flow region.